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CHICKEN PREPARATION METHODS GREATLY INFLUENCE THE FORMATION OF HETEROCYCLIC AROMATIC AMINES

Cynthia P. Salmon, Shilpi S. Mehta, Mark G. Knize, Rita K. Ng, and James S. Felton

Biology and Biotechnology Research Program, L-452, Lawrence Livermore National Laboratory, P.O. Box 808, Livermore, CA 94551-9900

The quantity of heterocyclic amines present in muscle meat depends on the physical form of the food and time and temperature of cooking. We compared several methods of preparing and cooking chicken to determine their effect on the formation of heterocyclic aromatic amines. First, whole breast or thigh was compared with ground breast or thigh patties. Standard-size portions (6 cm x 1.5 cm) of breast or thigh were flame-broiled on a propane barbecue grill for 10, 14, or 18 minutes. The cooked meat was homogenized, purified by solid-phase extraction, and analyzed by HPLC for three heterocyclic amines (MeIQx, DiMeIQx, and PhIP). Results show that MeIQx and PhIP levels are equal or lower in thigh meat than in breast meat, for both the whole and ground forms, with the greatest difference appearing at the 18 minute cooking time. Ground chicken breast is at least seven times lower in PhIP than whole chicken breast, especially for the longest time point. This effect is not observed for PhIP in ground thigh meat, nor is MeIQx consistently reduced by grinding either thigh or breast. DiMeIQx is not detectable in any of the samples.

Other experiments tested the effects of marinating chicken breasts before grilling. Marinating appears to increase MeIQx formation at the longest cooking time and to greatly reduce PhIP formation compared to non-marinated samples, which had 2 to 400 ppb PhIP, depending on cooking time.

We also surveyed 23 commercially-cooked chicken products obtained from grocery stores and restaurants. The products, which included gravies, soups, frozen dinners, and restaurant entrees, were tested for mutagenic activity on the Ames test. Results show low activity (2 to 49 TA98 revertants per gram cooked product) for all grocery or "fast food" restaurant products, while other restaurant entrees range from 130 to 420 revertants per gram.

These studies suggest that chicken is potentially a significant source of heterocyclic amines in the human diet, but the amounts are greatly dependent on the type of meat and the method of preparation.

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